

SPECIFICATION

TITLE OF THE INVENTION

COMPLEX IMAGE PROCESSING APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a complex image processing apparatus which can function as a facsimile apparatus and another kind of apparatus.

2. Description of the Related Art

Complex image processing apparatuses have been used which can function not only as facsimile apparatuses but also as printers or copiers utilizing image forming means for forming an image on a recording medium such as recording paper of the facsimile apparatus and as copiers or scanners utilizing image input means of the facsimile apparatus.

A facsimile apparatus which functions purely and simply as a facsimile apparatus has memory reception and memory transmission functions. The memory transmission function is to temporarily store a read document in a memory and to transmit the same. The memory reception function is to store received image information in a memory and to print the same later. A copier which functions purely and simply as a copying machine has functions such as storing read images in a memory temporarily

and copying, for example, one sheet of document on a plurality of sheets by reading images on the document only once. A printer has a function of temporarily storing image data for forming an image in a memory as an input buffer.

Also in a complex image processing apparatus, the same as in a facsimile apparatus, a copier and a printer each of which functions purely and simply as such, each function of the complex image processing apparatus can be effectively utilized using a memory independently for each function. Especially, in the case of a facsimile apparatus having a so-called memory reception function, since received image data can be accumulated in a memory and can be collectively output after a predetermined period, it is possible to avoid output in occasions when the user is absent at night or on vacation and therefore prevent output documents from being lost or stolen.

Memories in conventional complex image processing apparatuses operate independently to serve respective functions. A memory for copier is used for memory printing in a function as a copier. A memory for facsimile is used for memory transmission and memory reception. Further, a memory for printer is used only for storing image information based on a request for printing from a computer or the like on a network to which the printer is connected. According to such methods for using memories, however, a plurality of memories are required to allow each function to be satisfactorily performed,

and the capacity of each of the memories must be increased in order to improve the processing capability. In order to process image information whose volume exceeds the capacity of a memory, control must be carried out such that the relevant operation is carried out within the capacity of the memory, for example, as in Japanese Unexamined Patent Publication JP-A 10-243175 (1998) which discloses a method for use of a memory in a copier.

Even in an image processing apparatus having a complex function, the capacity of a memory for memory reception function is preferably as large as possible just as in a facsimile apparatus which functions purely and simply as an facsimile apparatus. However, since a conventional memory reception function outputs received image information in the order of reception, a user must re-sort output documents when the output documents are to be classified based on senders or when it is desired to check the presence of an important urgent document, although the conventional mode of output allows the order of reception to be understood. Such burdens to a user are significantly increased especially when the memory capacity is increased to output a large volume of data at a time.

Further, it is absolutely impossible to receive data whose volume exceeds the storage capacity of a memory if the principle of accepting data within the storage capacity of the memory is simply applied to the memory reception function of a facsimile apparatus as in the related art including that in

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It is an object of the invention to provide a complex image processing apparatus in which the capacity of memory reception which allows the apparatus to be utilized as a facsimile apparatus can be increased without increasing the memory capacity of the apparatus as a whole.

It is another object of the invention to provide a complex image processing apparatus capable of forming images on a recording medium in a pre-sorted state from a plurality of items of image information received using a memory reception function.

The invention provides a complex image processing apparatus capable of operating as a facsimile apparatus, comprising:

image reading means for reading image information of a document;

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image communicating means for transmitting the image
information read by the image reading means and receiving image
information;

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image forming means for recording the image information
received by the image communicating means on a recording medium;

mode switching means for carrying out switching among facsimile mode and other modes,

facsimile apparatus in which a memory reception function can be specified, and in the other modes, as other kinds of apparatuses. The memory for facsimile is available only in the facsimile mode, and the memories for other modes are available in the other modes. The memory control means performs control in the facsimile mode such that image information stored in the memory for facsimile is transferred to either or both of the memories for the other modes in the case where predetermined conditions are satisfied.

As a result, the memories for the other modes can be used in the facsimile mode in addition to the memory for facsimile when the predetermined conditions are satisfied, which makes it possible to effectively use the memories of the complex image processing apparatus for facsimile function as a whole. Therefore, even if the memory for facsimile has a small capacity, it is possible to prevent the occurrence of a busy state due to the lack of memory capacity for facsimile function, by transferring image information for the facsimile function to the memories for the other modes.

As described above, according to the invention, since the capacity of the memory to enable use of the apparatus as a facsimile apparatus in the facsimile mode can be increased by the addition of the memories for the other modes, the memories of the composite image forming apparatus as a whole can be effectively used to enable it to operate as a facsimile apparatus

[illegible]

According to the invention, since the memory control means stores image information in the memories for the other modes when the memory reception function is specified in the facsimile mode and the predetermined time has passed after the beginning of memory reception, it is possible to increase a memory capacity that can be used for memory reception, thereby allowing reception of a large volume of image information. Further, since a memory for storing received image information is the memory for facsimile within the predetermined time and the memories for the other modes when the predetermined time has passed, the received image information can be divided based on elapsed time.

According to the invention, when the remaining capacity of the memory for facsimile comes to the predetermined capacity

in the facsimile mode, received image information is transferred to the memories for the other modes . Accordingly even where the volume of reception data exceeds the remaining capacity of the memory for facsimile, the overflow of the data is prevented from failing to be stored. As described above, according to the invention, since received image information can be transferred to the memories for the other modes when only a small capacity is left in the memory for facsimile in the memory reception mode of the apparatus, the memories for the other modes can be effectively used to increase facsimile data reception capacity.

In the invention it is preferable that the predetermined capacity is set to a capacity for use in storing a largest volume of image information among per-communication reception volumes of image information in a reception history of the facsimile mode.

According to the invention, since the predetermined capacity that triggers storage of received image information into the memories for the other modes is set such that the capacity for use in storing the largest volume of image information among per-communication reception volumes of image information in the reception history of the facsimile mode is left, the memory for facsimile can be kept in a state in which the capacity for use in storing the largest volume of image information is left to increase reception data. As described

above, according to the invention, by transferring image information from the memory for facsimile to the memories for the other functions in the memory reception mode to enable the use of the apparatus as a facsimile apparatus, a vacant capacity for use in storing the largest volume of image information among per-communication reception volumes of image information in the reception history of the facsimile mode is left in the memory for facsimile, which makes it possible to receive data in a volume equal to or smaller than the largest volume of image information any time, thereby increasing reception data.

In the invention it is preferable that the memory control means performs control such that image information transferred to the memories for the other modes is rearranged according to predetermined criteria.

According to the invention, since image information transferred to the memories for the other modes is rearranged according to predetermined criteria, data received in the memory reception function can be stored in the memories for the other modes after being sorted based on, for example, the telephone numbers of the senders instead of simply storing the image information as it is received. As described above, according to the invention, image information received in the memory reception function is transferred to the memories for the other modes in a rearranged form, the image information can be read from the memories for the other modes in a pre-sorted

state.

In the invention it is preferable that the memory control means performs control such that the rearranged image information is sequentially transferred in the order of decreasing data sizes insofar as the rearranged image information can be stored in the memories for the other modes.

According to the invention, since the rearranged image information is sequentially transferred in the order of decreasing data sizes insofar as the rearranged image information can be stored in the memories for the other modes, the memories of the complex image processing apparatus can be effectively used. As described above, according to the invention, data rearranged in the order of their decreasing sizes can be read from the memories for the other modes, the memories of the complex image processing apparatus as a whole can be effectively used.

In the invention it is preferable that the memory control means makes a data format of image information transferred to the memories for the other modes, identical to a data format of image information stored in the memory for facsimile.

According to the invention, when image information received in the memory reception function of the apparatus as a facsimile apparatus is transferred to the memories for the other modes, the image information is stored in the data format identical to the data format of image information stored in the

memory for facsimile, which makes it possible to store image information in the memories for the other modes using a data format for facsimile communication on which a compression process is generally carried out to eliminate a need for a specified decompression process on the image information associated with the memories for the other modes and to store a large volume of image information in the memories for the other modes. As described above, according to the invention, there is no need for a process for converting a data format, and the memories for the other modes can be used similarly to the memory for facsimile.

In the invention it is preferable that in the case where received image information is stored in the memory for facsimile and in either or both of the memories for the other modes, the memory control means performs control such that the image forming means records image information stored in the memories for the other modes, on a recording medium prior to recording the image information stored in the memory for facsimile on a recording medium.

According to the invention, since control is carried out such that in the case where image information received in the memory reception function of the apparatus as a facsimile apparatus is stored in the memory for facsimile and the memories for the other modes, the image recording means records the image information transferred to the memories for the other modes on

to a recording medium, prior to recording image information stored in the memory for facsimile on a recording medium. This makes it possible to return the memories for the other modes to a vacant state quickly, thereby promoting recovery of other functions in which the memories are utilized, such as a copier or printer.

In the invention it is preferable that in the case where received image information is stored in the memory for facsimile and in either or both of the memories for the other modes, the memory control means performs control such that the image forming means records image information stored in the memory for facsimile on a recording medium, prior to recording the image information stored in the memories for the other modes on a recording medium.

According to the invention, since control is carried out such that in the case where image information received in the memory reception function of the apparatus as a facsimile apparatus is stored in the memory for facsimile and the memories for the other modes, the image recording means records the image information stored in the memory for facsimile on a recording medium prior to recording the image information stored in the memories for the other functions on a recording medium, the memory for facsimile can be quickly returned to a vacant state, and the next image information can be received even if the next image information has a large data size. As described above,

according to the invention, the memory for facsimile can be returned to a vacant state, which allows the memory reception function of the apparatus as a facsimile apparatus to be recovered quickly to make possible reception of the next data.

In the invention it is preferable that in the case where received image information is stored in the memory for facsimile and in either or both of the memories for the other modes, the memory control means performs control such that the image forming means records the image information on a recording medium in the order of decreasing data sizes starting with a piece of image information having a largest data size.

According to the invention, since image information stored in the memory for facsimile and the memories for the other modes in the memory reception function of the apparatus as a facsimile apparatus is recorded on a recording medium by the image forming means in the order of decreasing data sizes, a large vacant capacity is provided after the image information is recorded on the recording medium, to allow functions in the other modes to be recovered quickly.

BRIEF DESCRIPTION OF THE DRAWINGS

Other and further objects, features, and advantages of the invention will be more explicit from the following detailed description taken with reference to the drawings wherein:

Fig. 1 is a block diagram showing a schematic system

configuration of a complex image processing apparatus of an embodiment of the invention;

Fig. 2 is a block diagram showing a system configuration of a digital complex machine 30 of an embodiment of the complex image processing apparatus in Fig. 1;

Fig. 3 is a block diagram showing an electrical configuration of the digital complex machine 30 in Fig. 2;

Fig. 4 is a flow chart showing steps of operation in the case where a principle for using memories in combination according to the related art is applied to the complex image processing apparatus in Fig. 1;

Fig. 5 is a flow chart showing steps for using memories in combination according to the invention in the complex image processing apparatus in Fig. 1;

Fig. 6 is a flow chart showing steps of a process of rearranging data in a memory for facsimile 7 at step S509 in Fig. 5 and a process of transferring data in the memory for facsimile 7 at step S510;

Fig. 7 is a flow chart showing steps of a process of printing facsimile data accumulated in a memory for each function of the complex image processing apparatus in Fig. 1 so that facsimile data in the memory for facsimile 7 is printed lastly;

Fig. 8 is a flow chart showing steps of a process of printing facsimile data accumulated in the memory for each

the data at the printing process section 5. A compression/decompression section 8 is provided for this purpose. When priority in recording of image data in the memory for facsimile 7 is set to capacity, the image data switching section 3 stores image data in the memory for facsimile 7 after compressing the same at the compression/decompression section 8. This makes it possible to accumulate image data using a smaller memory capacity. On the contrary, when priority is set to image quality, image data are accumulated in the memory for facsimile 7 via a bypass line 9 for bypassing the compression/decompression section 8 to directly accumulate the data in the memory for facsimile 7 in an uncompressed state, which makes it possible to accumulate them with image quality similar to that of image data accumulated in the memory for copier 6.

In the complex image processing apparatus in Fig. 1, a memory for printer 10 is provided in addition to the memory for copier 6 and memory for facsimile 7. The memory for printer 10 can be also used in combination with the memory for copier 6 similarly to the memory for facsimile 7. In the case where priority is set to image quality, a selection can be made to use the memory for printer 10 in combination with the memory for copier 6 before using the memory for facsimile 7.

In the normal printer mode, image data transmitted by a personal computer 11 are temporarily stored in the memory for

data switching section 3 to the compression/decompression section 8 to carry out a compression process on the same and are thereafter transmitted to a modem 12 via the memory for facsimile 7 and output to a communication line. In the case of direct transmission, image data are read by the image reading section 1 in conjunction with the transmission and output of image data. During memory transmission, the reading at the reading section 1 precedes the transmission and output to the communication line independently of the same, and image data that are a difference between the read data and the transmitted output are accumulated in the memory for facsimile 7.

During reception in the facsimile mode, facsimile data received from a communication line is supplied from the modem 12 via the memory for facsimile 7 to the compression/decompression section 8 to be subjected to a decompression process and are thereafter supplied from the image data switching section 3 to the printing process section 5 via the LSU control section 4. When the printing process at the printing process section 5 is disabled for the lack of paper or the like, the facsimile data are accumulated in the memory for facsimile 7 as they are in the compressed state. Before the memory for facsimile 7 becomes full, the facsimile data accumulated in the memory for facsimile 7 are transferred via a bypass line 13 to the memory for copier 6 or memory for printer 10 to be accumulated therein in a compressed state similar to

a document table 35 constituted by a transparent glass and, in addition, a recirculating automatic document feeder (hereinafter abbreviated as "RADF") 36 and a scanner unit 40. The scanner 31 is set such that sheets of document are placed on the document table one after another and images of the same are sequentially read. The RADF 36 transports documents set in a predetermined document tray which is not shown one after another on to the document table 35. It has a function of transporting documents to a predetermined discharge position after images are read therefrom by the scanner unit 40. The RADF 36 can also transport the documents again to the document table 35 by turning them inside out after images are read from the documents by the scanner unit 40. Therefore, in addition to transport path for single-side reading used for reading one side of documents, the RADF 36 has a transport path for double-side reading used for reading both sides of documents, guides for switching the transport path to be used, a sensor for checking the state of documents in each of the transport paths, a control section and the like. In the scanner 31, the scanner unit 40 can read images on both sides of documents using such an RADF 36. The configuration of the RADF 36 will not be described in detail because it is well-known.

The scanner unit 40 is configured as a document image reading unit for reading an image of a document transported on to the document table 35 in each unit in the direction of a scan

from a main CPU 15.

The laser recording section 32 is provided for forming an image on recording paper based on the image data. The laser recording section 32 has an LSU 46, an electrophotographic process section 47, a photosensitive drum 48, a fixing device 49, a sheet transport section 50, etc. The LSU 46 irradiates the photosensitive drum 48 of the electrophotographic process section 47 with laser light based on image data read by the scanner 31 or image data input from the outside to form an electrostatic latent image on the photosensitive drum 48. The LSU 46 has a semiconductor laser light source, a polygon mirror for polarizing laser light at equal angular speeds and an f- θ lens. The f- θ lens corrects the laser light polarized by the polygon mirror such that it is polarized on the surface of the photosensitive drum 48 at equal angular speeds.

The electrophotographic process section 47 has the photosensitive drum 48 and a charging device, a developing device, a transfer device, a peeling device, a cleaning device and an static eliminator provided around the photosensitive drum 48. It has a function of developing an electrostatic latent image formed on the photosensitive drum 48 by the LSU 46 to form a toner image and electrostatically transferring it on to recording paper. The configuration of such an LSU 46 and electrophotographic process section 47 will not be described in detail because they are well-known.

The sheet transfer mechanism 50 has a function of supplying recording paper to the electrophotographic process section 47, fixing a transferred image on the recording paper and discharging the recording paper to the outside. In addition to the transport section 33, post-process section 34 and fixing device 49, the sheet transfer mechanism 50 has cassette paper feeding devices 51, 52 and 53, a manual paper feeding device 54, a double-side copying unit 55, a recirculating path 56 and a paper discharge roller 57. The transport section 33 transports recording paper from the cassette paper feeding devices 51 through 53, manual paper feeding device 54 or recirculating path 56 to a predetermined transfer position of the electrophotographic process section 47. The transfer device is disposed in the transfer position. The cassette paper feeding devices 51 through 53 are provided to contain recording paper for transfer and to feed the recording paper into the transport section 33 when transfer is carried out. The manual paper feeding device 54 is used to supply recording paper of a type which is not contained in the cassette paper feeding devices 51 through 53 to the transport section 33. The fixing device 49 is provided to fix a toner image transferred on to recording paper. The double-side copying unit 55 is used to recirculate recording paper to the transport section 33 after the toner image is fixed to form an image on the other side of the recording paper. The recirculating path 56 is provided to

It is then discharged from the second discharge roller to the second discharge tray 342.

In the third discharging mode, recording paper received by the paper receiving port is guided by the first switching gate to the second transport path and is thereafter guided by the second switching gate to the third transport path. When the rear end of the recording paper passes the second switching gate, the recording paper is transported on a switch-back manner, guided by the second switching gate to the second discharge roller and discharged from the second discharge roller to the second discharge tray 342.

Further, an offset mechanism is provided at each of the discharge trays 341 and 342. Each offset mechanism moves the discharge tray in a direction perpendicular to the direction in which recording paper is discharged. This makes it possible to contain discharged recording paper, the paper being sorted based on jobs or modes. Those offset mechanisms are also mechanisms which have been well known.

Fig. 3 shows a control system of the digital complex machine 30. In addition to the members shown in Fig. 2, the digital complex machine 30 has an operation panel board 100, a machine control board 200, a CCD board 300, a main image processing board 400, a sub image processing board 500 and a group of expansion boards 600 as boards that form a control system. Those boards control each member in the digital complex

machine 30 and process images read by the scanner 31.

The operation panel board 100 shown in an upper right part of Fig. 3 includes a sub CPU 101, a memory 102, an operation panel 103, a liquid crystal display (hereinafter abbreviated as "LCD") display section 104, a group of operating keys 105, etc. The sub CPU 101 manages and controls the LCD display section 104 and the group of operating keys 105 provided on the operation panel 103. The memory 102 stores various control information of the operation panel board 100 from the operation panel 103 including instruction data from the group of operating keys 105 and information to be displayed on the LCD display section 104.

The machine control board 200 located in an upper left part of Fig. 3 has a sub CPU 201, a memory 202, etc. The RADF 36, scanner 31, electrophotographic process section 47, double-side copying unit 55 and post-processing device 34 shown in Fig. 2 are controlled by the sub CPU 201.

The CCD board 300 located in a lower left part of Fig. 3 has the CCD 44 shown in Fig. 2 and generates image data constituted by an electric signal based on light reflected by a document. A digital circuit 302 such as a CCD gate array is provided to drive the CCD 44, and there is also provided an analog circuit 303 for adjusting the gain of an analog output from the CCD 44, an A-D converter 304 for generating image data which is a digital signal from the analog output, etc. Each

constituent part of the CCD board 300 is controlled and managed by a main CPU 401 of the main image processing board 400.

The main image processing board 400 carries out image processing on image data generated by the CCD board 300 and constitutes a major part of the image processing section 2 shown in Fig. 1. Specifically, the main image processing board 400 has the main CPU 401, a multivalue image processing section 402, a memory 403 and a laser controller 404. The main CPU 401 has a function of controlling each member of the digital complex machine 30 in cooperation with other boards, RADF 36 and the sub CPU provided in the post-processing device 34 and managing the operation of the same. The multivalue image processing section 402 carries out image processing on image data transferred from the CCD board 300 such that an image having desired tones can be formed on recording paper. Image processes carried out by the multivalue image processing section 402 are image processes on multivalue image data such as shading correction, density correction, partitioning, a filtering process, MTF correction, resolution change, electronic zooming for changing a magnification and gamma correction.

The memory 403 is provided to store various control data such as image data which have been subjected to image processing and data for managing steps of the image processing. The laser controller 404 transfers image data which have been subjected to image processing to the LSU 46. The main CPU 401 communicates

control data with the sub CPU 101 of the operation panel board 100 and inputs instruction data from a user. The main CPU 401 also transfers control data indicating the state of operation of the digital complex machine 30 to the sub CPU 101. The sub CPU 101 displays the state of operation of the digital complex machine 30 on the LCD display section 104.

The sub image processing board 500 is another image processing section provided to carry out further image processes on image data which have been subjected to image processing at the main image processing board 400. The sub image processing board 500 has a binary value image processing section 501, a memory section 502, a hard disk device 503 and an interface section 504. The binary value image processing section 501 is provided to binarize image data which have been subjected to image processing at the main image processing board 400 values and carry out further image processing on the same. It has a multivalue-to-binary-value converting section for converting multivalue image data into binary value image data, an image rotating process section for rotating an image, a binary value zoom process section for carrying out a process of changing the magnification of a binary value image and a compression/decompression process section for carrying out compression and decompression processes. Further, the binary value image processing section 501 has a facsimile interface for facsimile communication. The binary value image processing

facsimile communication and controlling the laser recording section 32 to output image data received via facsimile communication.

A description will now be made on image data processing in the facsimile mode in which the digital complex machine 30 operates as a facsimile apparatus. The facsimile mode includes two modes, i.e., a transmission mode and a reception mode. First, the transmission mode will be described. In the transmission mode, image data of a document read by the scanner 31 are transmitted to an external destination via facsimile communication. In this mode, a user sets documents in a predetermined position of the RADF 36. They are fed on to the document table 35 one after another by the RADF 36. The scanner unit 40 and CCD board 300 read an image of each document, generate 8-bit image data and transfer the same to the main image processing board 400.

The multivalue image processing section 402 of the main image processing board 400 carries out predetermined multivalue images processes such as gamma correction on the 8-bit image data and transfers the same to the sub image processing board 500 via connectors 405 and 505. The multivalue-to-binary-value converting section of the binary value image processing section 501 of the sub image processing board 500 carries out an error diffusing process on the 8-bit image data and thereafter converts the same into 2-bit image data. The image data which

processing board 500 receives the image data via the fax interface provided at the binary value image processing section 501, decompresses the image data at the compression/decompression process section to reproduce the same as image data for each page and thereafter transfers the same to the main image processing board 400. The data are subjected to gamma correction at the main image processing board 400 and are thereafter transferred to the LSU 46 of the laser recording section 32 via the laser controller 404. Thus, the laser recording section 32 can output image data with tones based on image data received from the outside via facsimile communication.

The memory reception function will now be described. The memory reception mode is a mode in which the main CPU 401 performs a function of storing reception data transmitted from the sub image processing board 500 in the memory 403 for a predetermined period instead of outputting the same immediately. In the embodiment of the invention, when a predetermined time for printing comes, the main CPU 401 can transfer all of reception data in the memory 403 to the laser recording section 32 to output them at a time. That is, the memory reception mode is preferably used to start output in occasions when the user is absent such as nights and vacations.

Figs. 4 and 5 show a method for using the memory for facsimile 7, memory for copier 6 and memory for printer 10 in

combination during memory reception in the facsimile mode. Fig. 4 shows a method for using the memories in combination utilizing a conventional art and operations thereof are as follows. When facsimile data as a result of facsimile communication is received at step S401, it is determined at step S402 whether the memory reception function is selected or not and, if it is selected, a reception process is started at step S403. It is determined at step S404 whether there is a free space in the memory for facsimile 7 and, in the case where there is a free space, the reception data are continuously accumulated in the memory for facsimile 7 at step S405. It is determined again at step S406 whether there is a free space in the memory for facsimile 7 and, in the case where there is a free space, the received facsimile data is continuously accumulated in the memory for facsimile 7 at step S407. The process returns to step S403 to repeat the above-described operations until it is determined at step S408 that all data have been received. In the case where it is determined at step S404 or S406 that there is no free space in the memory for facsimile 7, it is determined at step S409 whether there is a free space in the memory for copier 6 and, in the case where there is a free space, the received facsimile data is accumulated in the memory for copier 6 at step S410. In the case where it is determined at step S409 that there is no free space in the memory for copier 6, a busy signal is output to the sending side to have the output stopped

temporarily at step S411.

In the case where it is determined at step S402 that the memory reception function is not selected, it is determined at step S412 whether the direct reception function is selected or not. In the case where the direct reception function is not selected, the process returns to step S402 and, in the case where it is selected, a reception process at step S413 and a printing process at S414 are started in parallel. It is determined at step S415 whether all of the received facsimile data has been printed or not and, in the case where not all of the data have been printed, the process returns to steps S413 and S415. Then, in the case where it is determined that all of the data have been printed, the process proceeds to step S416 to terminate the printing process, which is the end of the entire operation.

While such control allows the memory for facsimile 7 and memory for copier 6 to be used in combination, it has not relation with facsimile data received using memory reception function accumulated in the memory for copier 6, and it is unknown which item of facsimile data is required. In addition, problems such as difficulty in a sorting operation that follows printing can occur because facsimile data are read from each of the memories during printing. In the embodiment of the invention, control as shown in Fig. 5 is carried out to solve such problems.

When facsimile data is received at step S501 in Fig. 5, it is determined at step S502 whether the memory reception

received facsimile data has been printed or not and, in the case where not all of the data have been printed, the process returns to steps S512 and S513. Then, in the case where it is determined at step S514 that all of the facsimile data have been printed, the process proceeds to step S515 to terminate the printing process, which is the end of the entire operation. Thus, by rearranging and transferring the data at a certain point in time, the memories can be used in combination, and the reception of facsimile data can be carried out only by the memory for facsimile 7.

Fig. 6 specifically shows the process of rearranging the data in the memory for facsimile 7 at step S509 in Fig. 5 and the process of transferring the data in the memory for facsimile 7 at step S510. At step S601, it is determined whether there is received facsimile data in the facsimile memory 7 or not, and the rearranging and transfer processes are not carried out. In the case where it is determined at step S601 that there is reception data in the memory for facsimile 7, the data in the memory for facsimile 7 are grouped in accordance with set conditions at step S602. At step S603, an index indicating a group name which represents the set conditions is applied to the first or last page of each item of data.

Then, the data transfer process is entered. It is determined at step S604 whether one selected group can be stored in the memory for copier 6 or the like. In the case where it

S701 in the case where it is desirable to release the memory for printer 10 first.

Fig. 8 shows specific processing steps for printing data in the memory for facsimile 7 first. Until it is determined at step S801 that the memory for facsimile 7 has become empty, facsimile data in the memory for facsimile 7 are printed at step S802. Next, until it is determined at step S803 that the memory for copier 6 has no further data, data in the memory for copier 6 are printed at step S804. Finally, until it is determined at step S805 that the memory for printer 10 has no further data, data in the memory for printer 10 are printed at step S806. Such a process makes it possible to release the memory for facsimile 7 quickly, thereby allowing the memory reception function in the facsimile mode to be quickly and effectively recovered. While the memory for copier 6 is first checked at step S803 to release the memory for copier 6 prior to the memory for printer 10, the vacancy of the memory for printer 10 may be checked at step S803 in the case where it is desirable to release the memory for printer 10 first.

Fig. 9 shows specific processing steps for printing sets of facsimile data in the memories for various functions sequentially in the order of decreasing volumes while checking the largest volume of the sets of facsimile data. First, at step S901, the largest volume of data in the memory for facsimile 7 is compared with the largest volume of data in the memory for

copier 6, and in the case where the largest volume of data in the memory for copier 6 is larger, the largest volume of data in the memory for copier 6 is printed at step S902. Next, at step S903, the largest volume of data in the memory for facsimile 7 is compared with the maximum volume of data in the memory for printer 10. In the case where the largest volume of data in the memory for printer 10 is larger, the largest volume of data in the memory for printer 10 is printed at step S904. In the case where it is determined at step S901 that the largest volume of data in the memory for facsimile 7 is larger, the largest volume of data in the memory for facsimile 7 is printed at step S905. Next, at step S906, the largest volume of data in the memory for copier 6 is compared with the largest volume of data in the memory for printer 10 and, in the case where the largest volume of data in the memory for printer 10 is larger, the largest volume of data in the memory for printer 10 is printed at step S904. In the case where the largest volume of data in the memory for printer 10 is smaller at steps S903 and S906, it is determined at step S907 whether the memory for facsimile 7 has become empty. The process returns to step S901 to repeat the above-described operations until it is determined that the memory for facsimile 7 is empty. Then, it is determined at step S908 whether the memory for copier 6 has become empty, and the process returns to step S901 to repeat the above-described operations until it is determined that the memory for copier 6 is empty. Finally,

it is determined at step S909 whether the memory for printer 10 has become empty, and the process returns to step S901 to repeat the above-described operations until it is determined that the memory for printer 10 is empty. Thus, the maximum capacities in the memories for various functions are compared with each other, and printing is sequentially carried out starting with the largest volume of data, which makes it possible to enable the memories for various functions evenly without any imbalance.

While the above-described digital complex machine 30 of the embodiment of the invention has functions of a facsimile apparatus, a copier and a printer, it may also be caused to function as a scanner for fetching image data into the personal computer 11 or the like using the scanner unit 40. Those functions are enabled for concurrent operations, and settings are possible including a setting in which when the operation of any of the functions has already been started, the other functions wait for the termination of the operation and a setting in which top priority is given, for example, to the facsimile mode to enable reception of facsimile data by interrupting the operation of the apparatus, for example, as a printer when facsimile communication is received during the use of the apparatus as a printer.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics

thereof. The present embodiments are therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description and all changes which come within the meaning and the range of equivalency of the claims are therefore intended to be embraced therein.

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